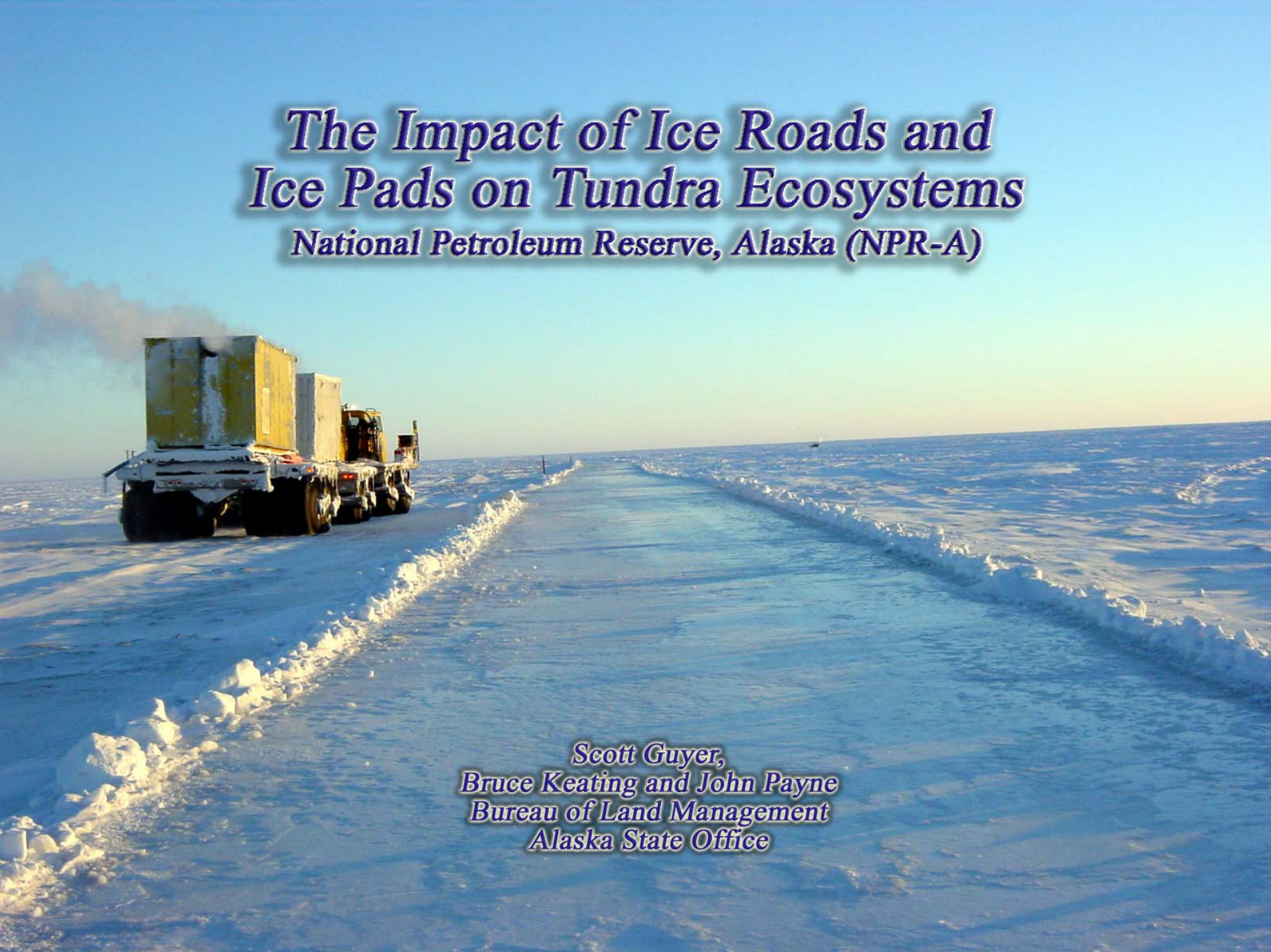
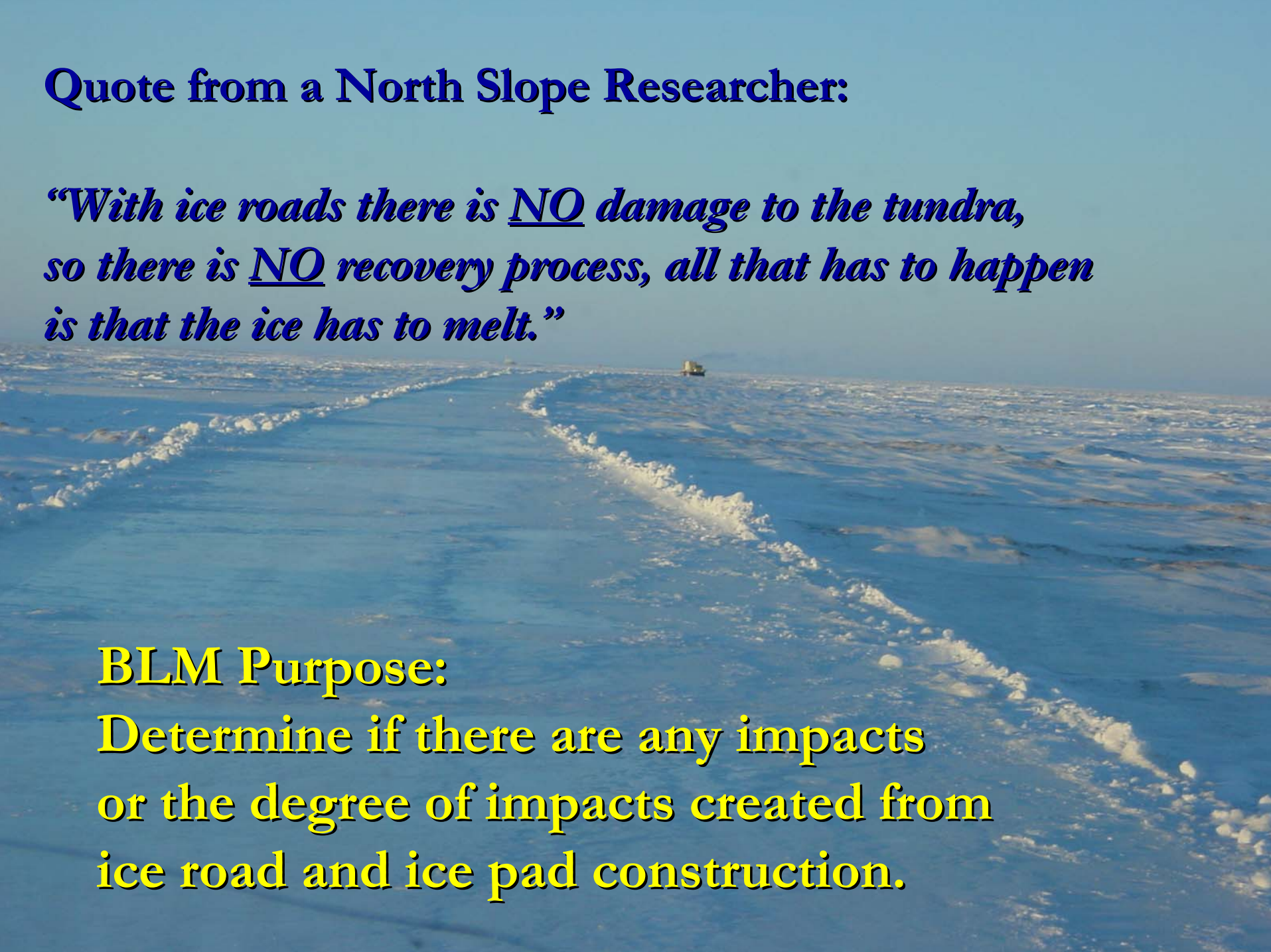
The Impact of Ice Roads and Ice Pads on Tundra Ecosystems

National Petroleum Reserve, Alaska (NPR-A)



Scott Guyer,
Bruce Keating and John Payne
Bureau of Land Management
Alaska State Office

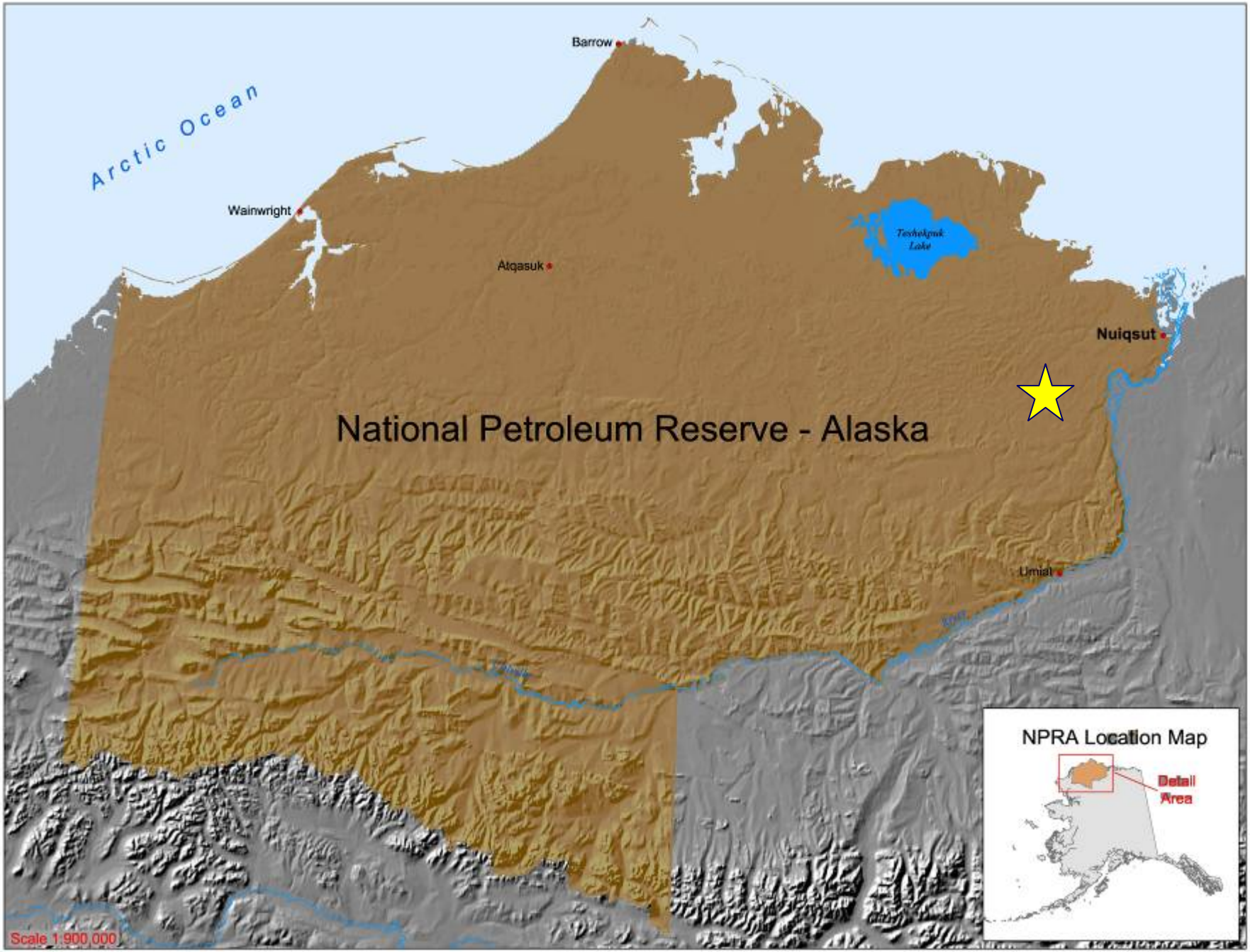


Quote from a North Slope Researcher:

"With ice roads there is NO damage to the tundra, so there is NO recovery process, all that has to happen is that the ice has to melt."

BLM Purpose:
Determine if there are any impacts or the degree of impacts created from ice road and ice pad construction.

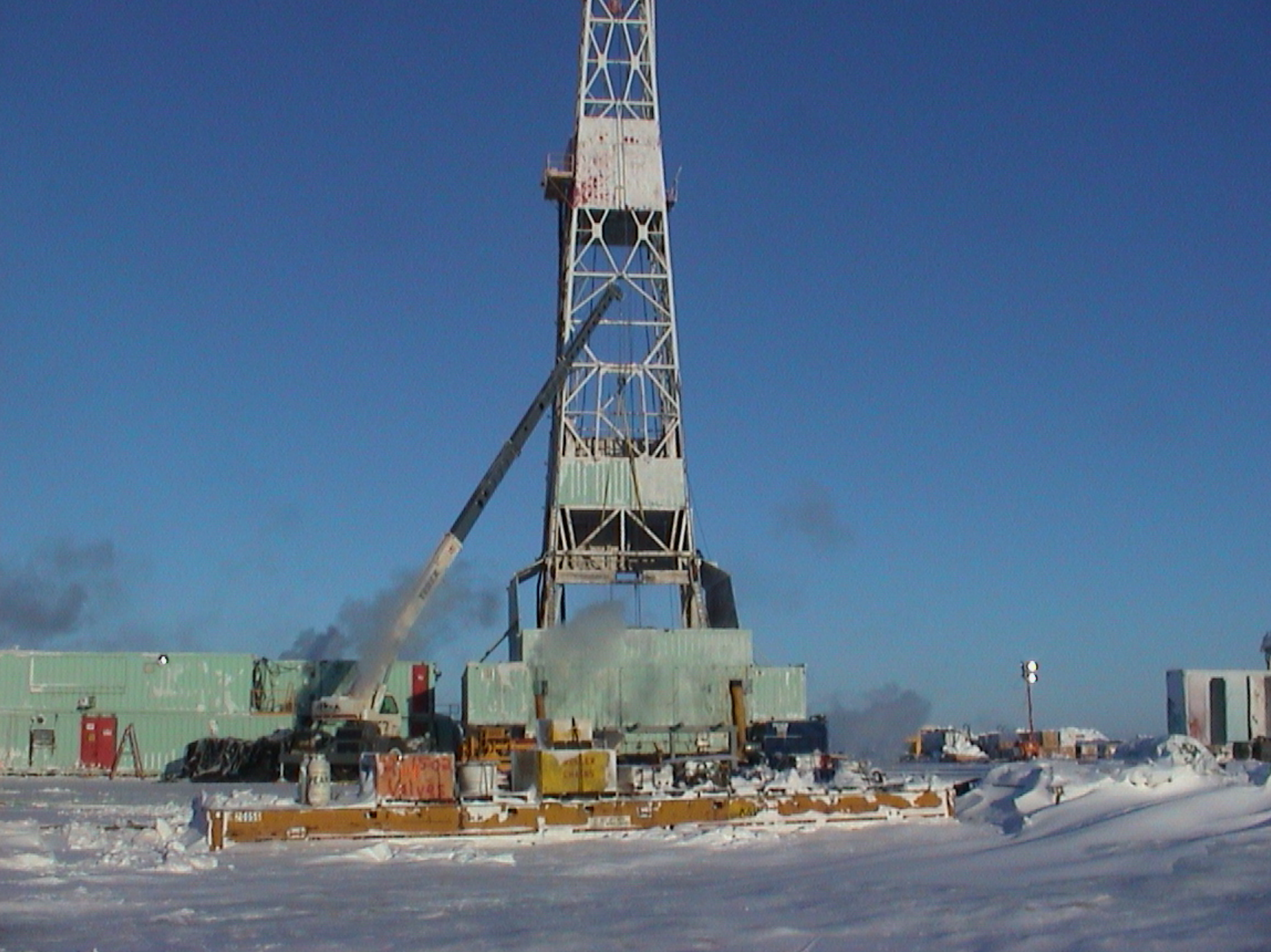

North Slope of Alaska
Study Area
Alaska


Arctic Ocean
Barrow
Wainwright
Atqasuk
Teshekpuk Lake
Nuiqsut
Umiat
National Petroleum Reserve - Alaska
NPRA Location Map
Detail Area
Scale 1:900,000

METHODOLOGY:

- **Use NTM Imagery as source to determine ice road location.**
- **Compare current Ice Road impacts to the recovery of a 1978 Ice Road.**
- **Permafrost depth analysis**
- **Vegetation Transects**

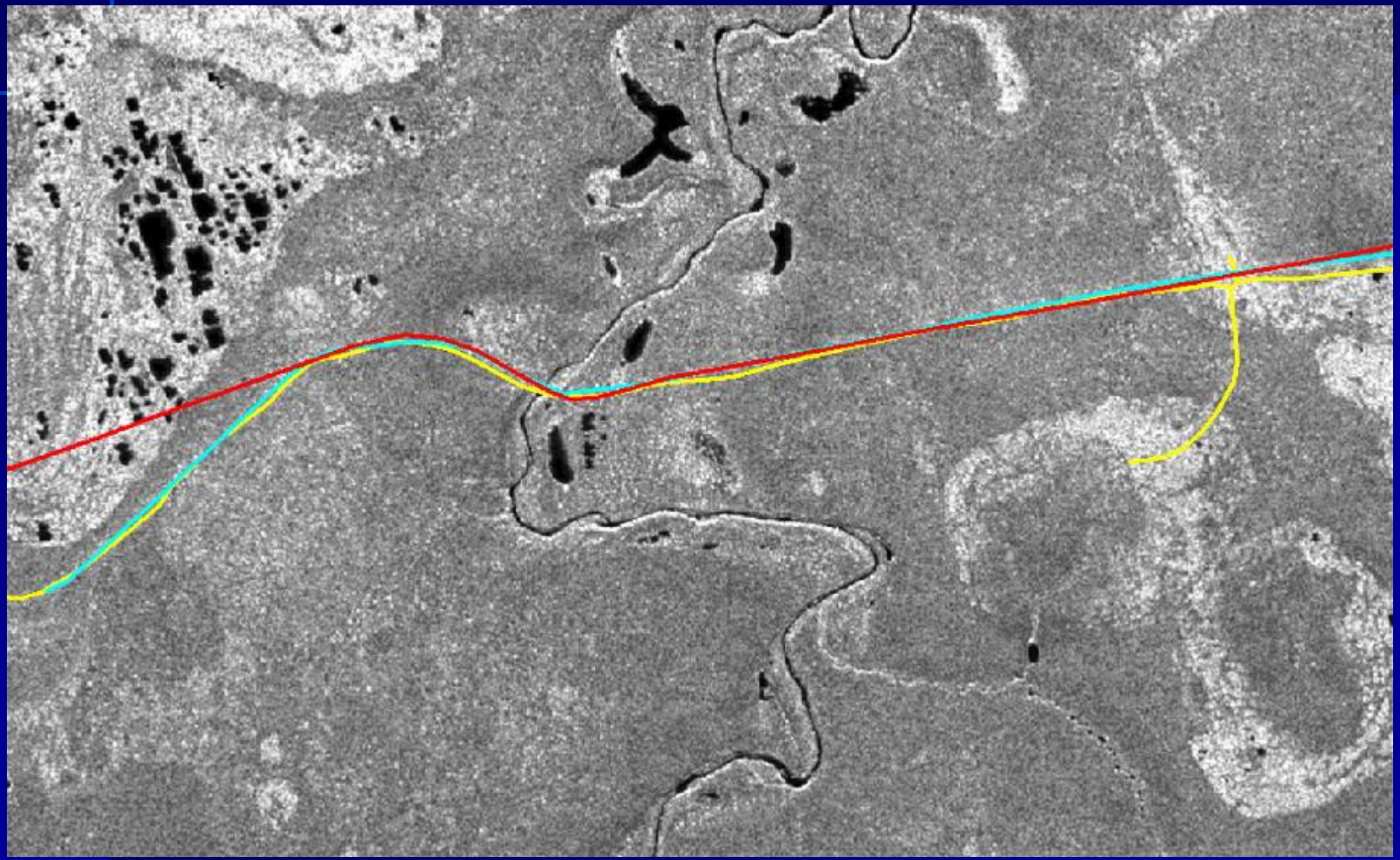
How to build an Ice Road?



GOUO

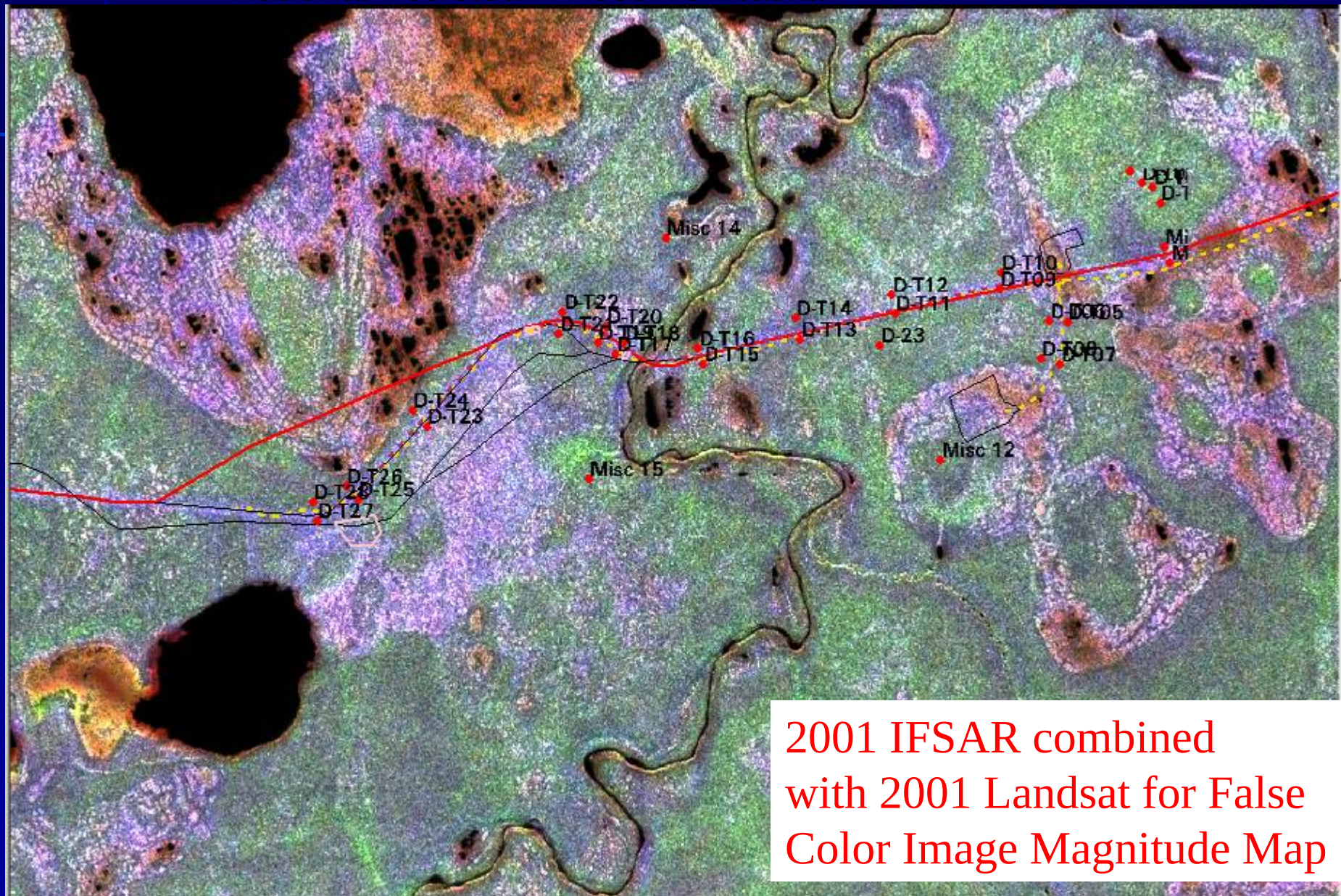
2000/2001/2002 Ice Roads

National Petroleum Reserve-Alaska



GOUO 2002 Ice Road and Trails

National Petroleum Reserve-Alaska



2001 IFSAR combined with 2001 Landsat for False Color Image Magnitude Map

Survey Equipment

Laser Alignment LB-9
(Laser Leveler)

Trimble ProXR-GPS
& Steel Permafrost probe

Data Collected:

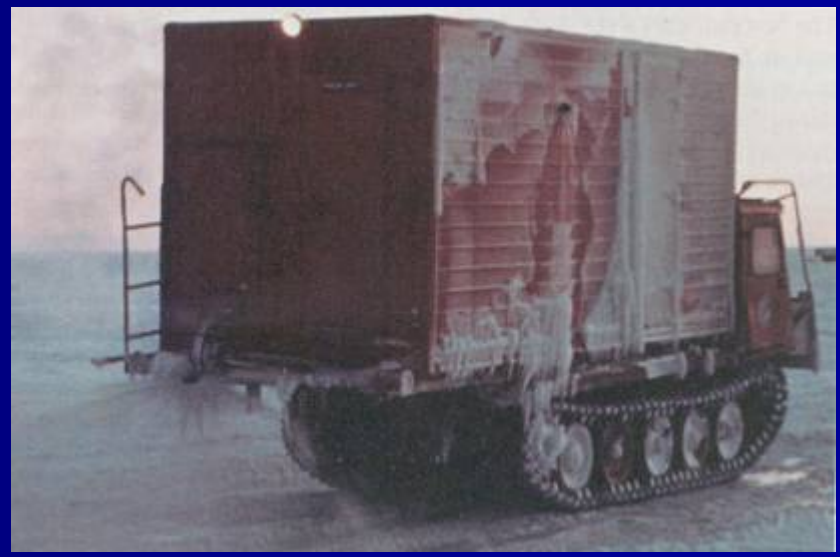
-profiles of surface terrain
-depth to permafrost
-vegetation percent cover
-vegetation impact index

Ice Road trace...


31 8:59PM

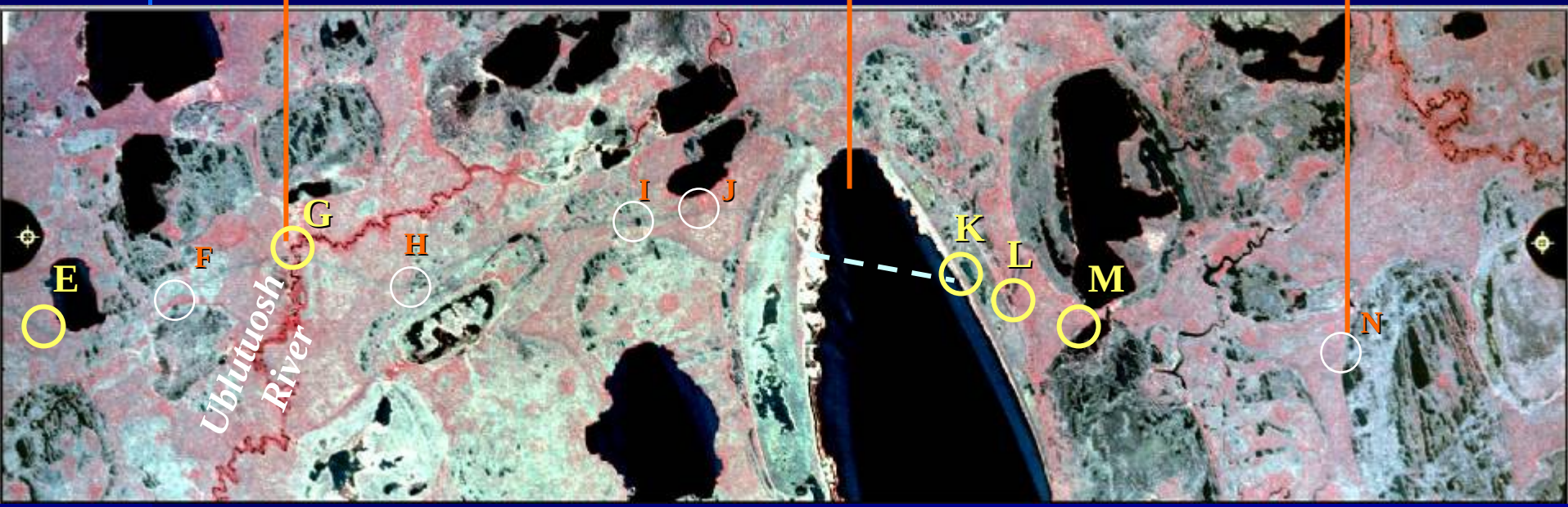

31 9:00PM

Inigok Ice Road 1978



- 37.5 miles of ice road.
- Construction began Feb. 1 and ended March 8.
- Gravel was hauled each day for 38 days.
- Total gravel hauled 132,000 tons.
- 35,000,000 gallons of water use to construct the road.

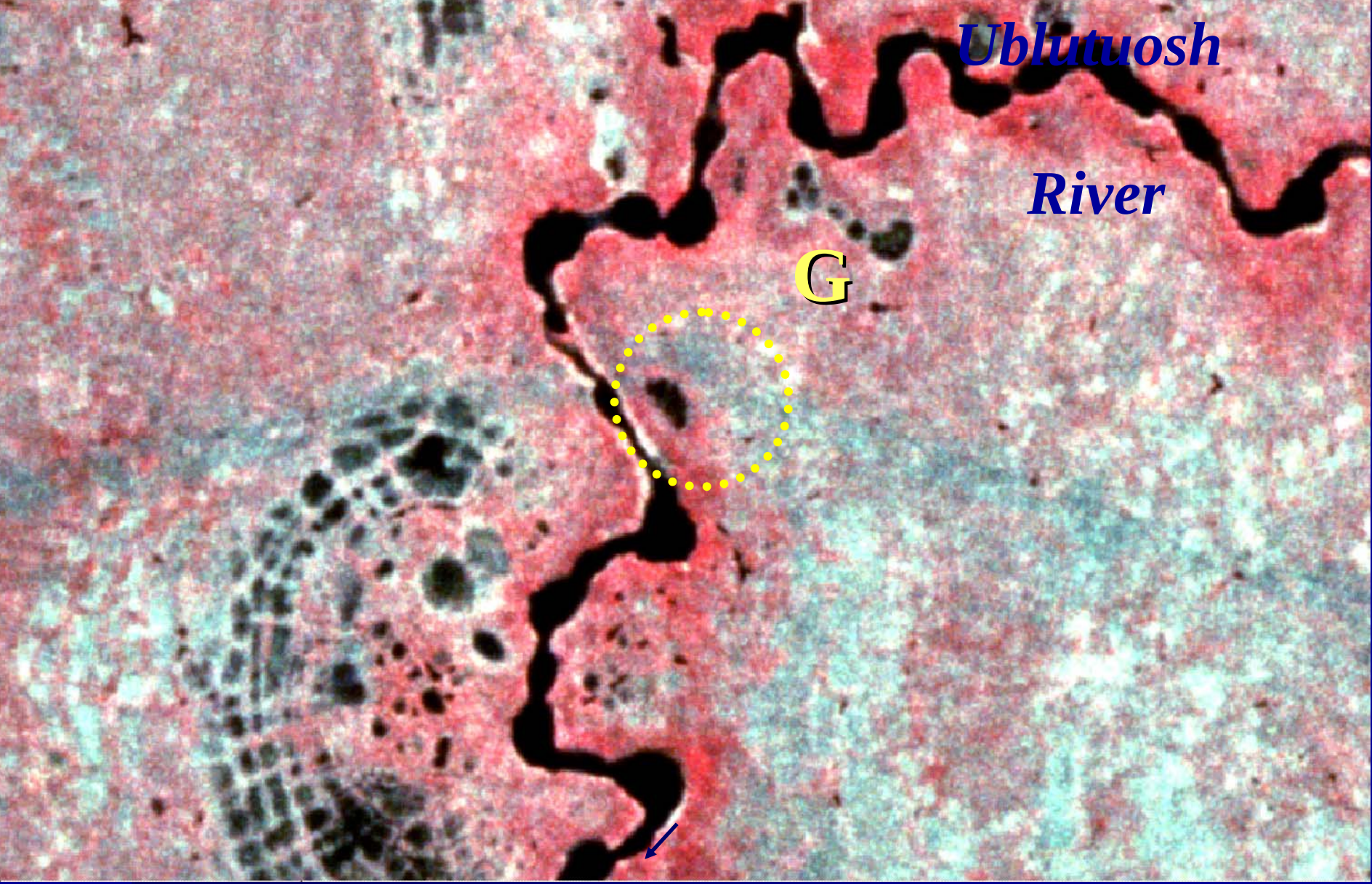
NASA CIR Photo Date: July 1979



Sites E to N

N

Yellow Letters are Transect Locations



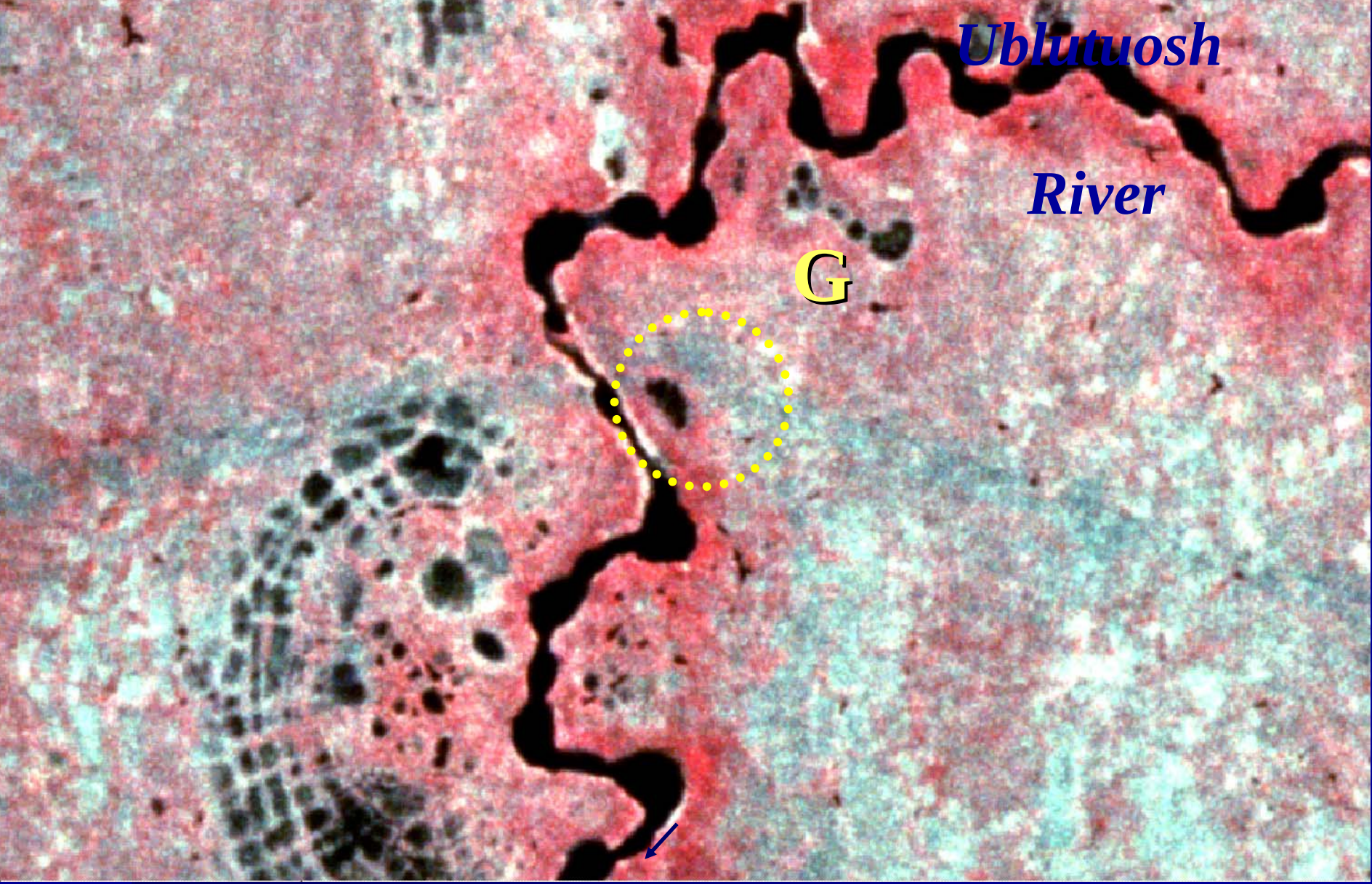
N

Site G enlargement Ice Road Trace Crossing Ublutuosh River

G-NAD 27	543,221 E	7,764,713 N
NAD 83	543,103 E	7,765,845 N

Photo #02786-2443, Date: July 1979

NASA CIR July 18, 2002



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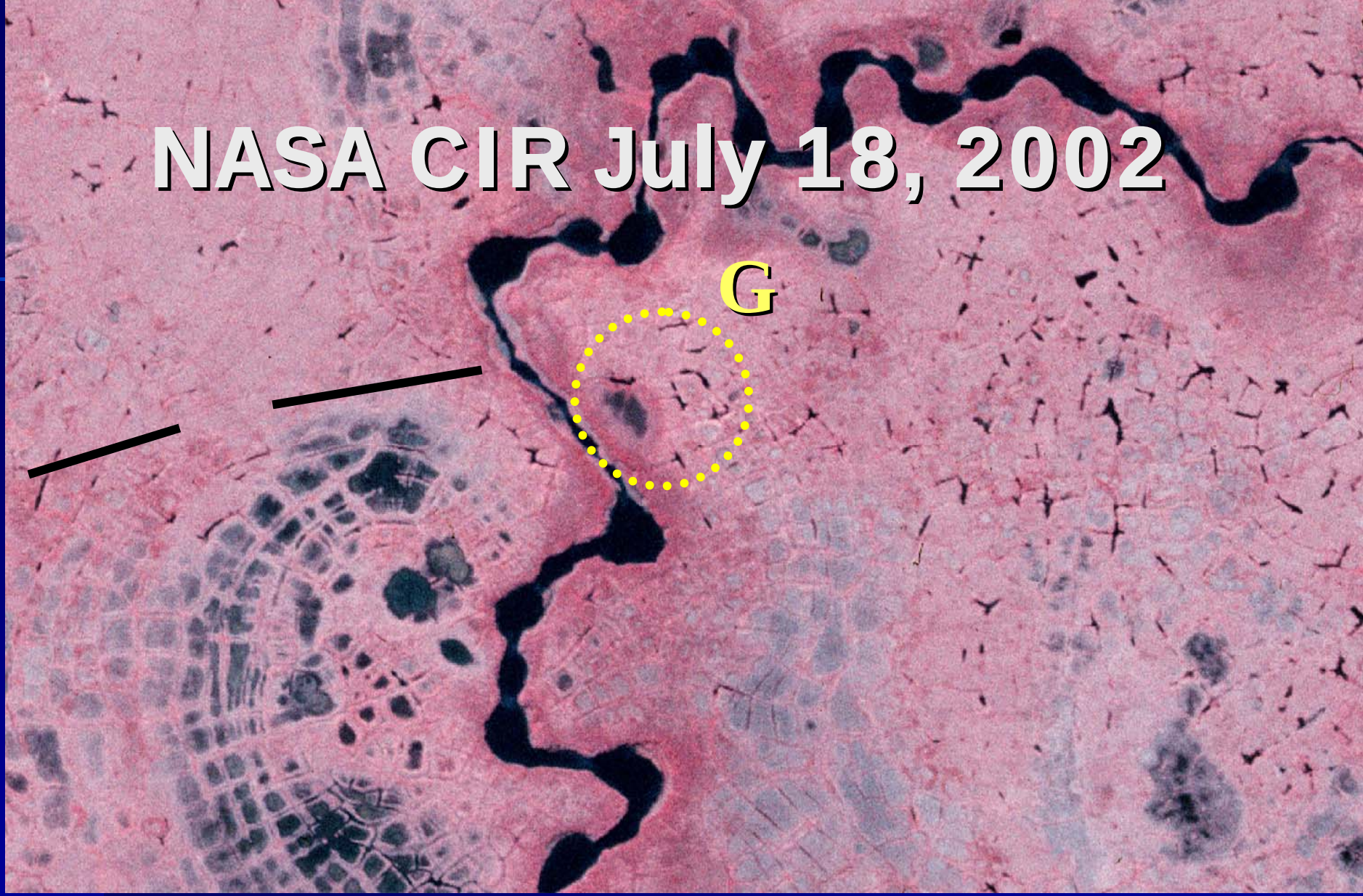
NASA CIR July 18, 2002


NASA CIR July 18, 2002
G


NASA CIR July 18, 2002
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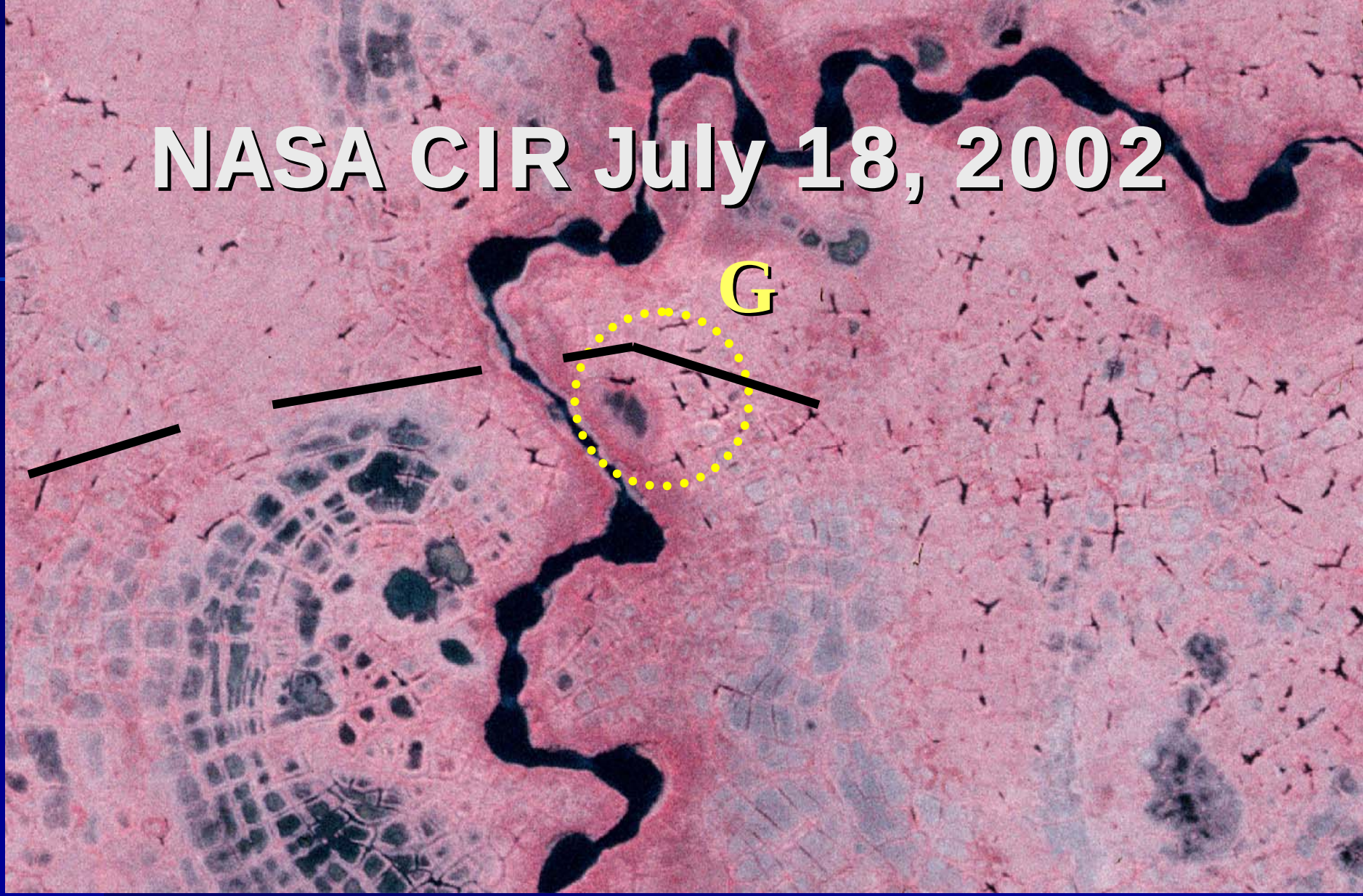
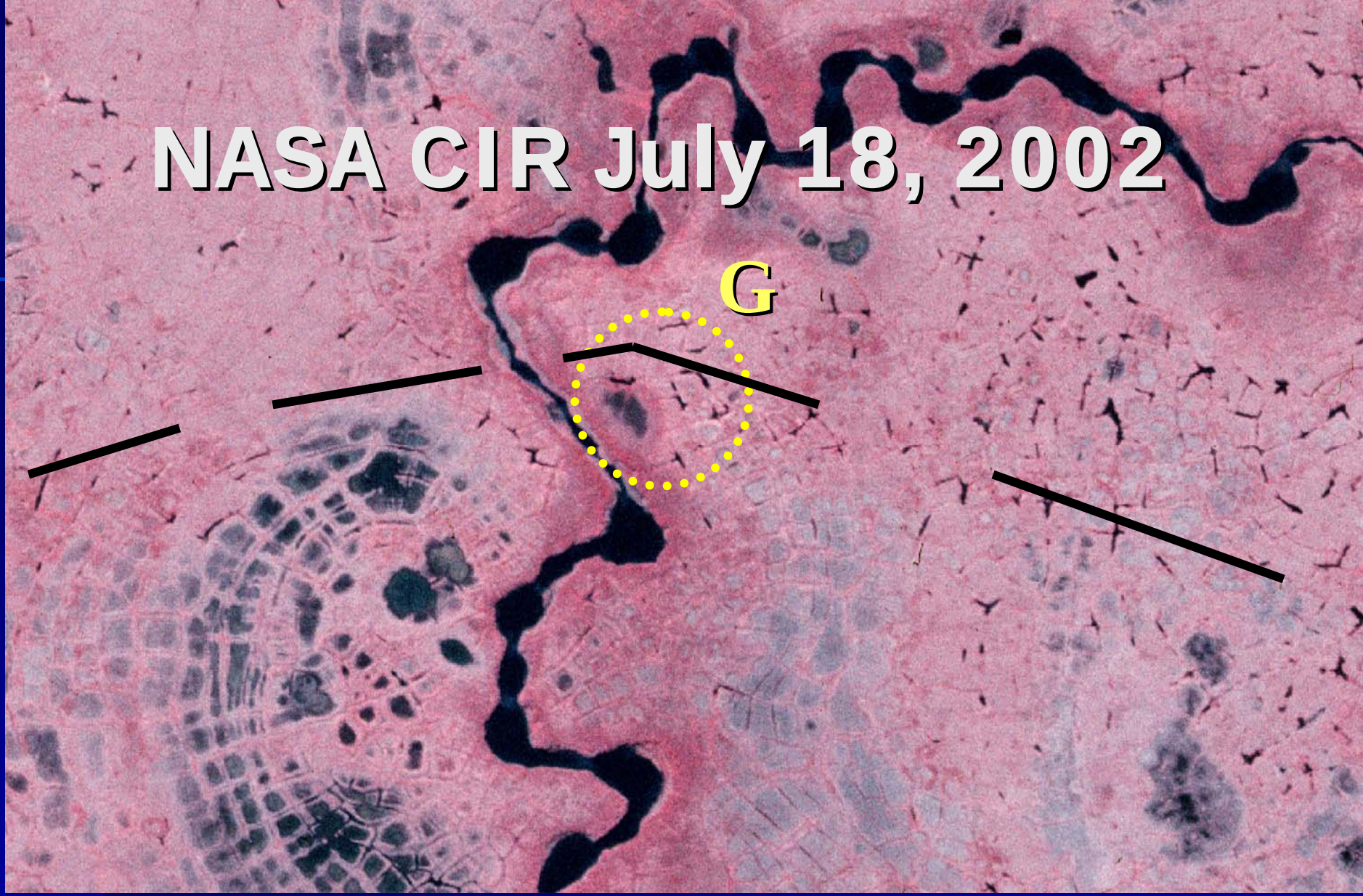
NASA CIR July 18, 2002



NASA CIR July 18, 2002

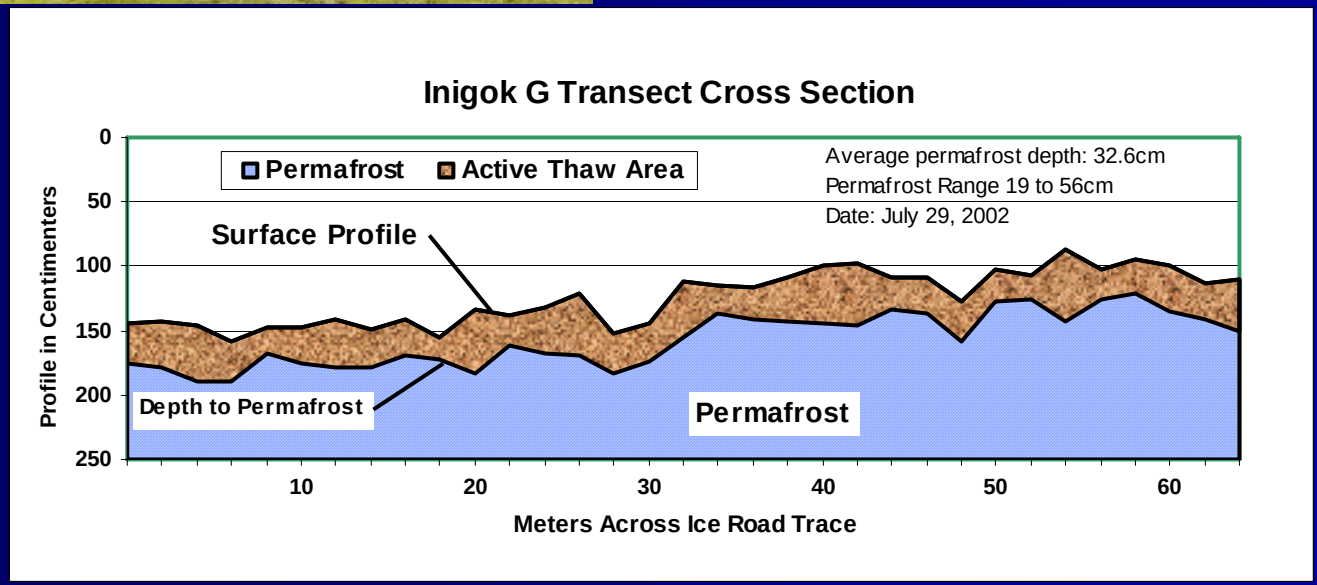


NASA CIR July 18, 2002

Depth to Permafrost Transect Inigok G

Looking West

Looking West



Inigok G- Photos

Inigok G- Photos-1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Inigok G- Photos

Inigok G- Photos-1

Ice Road Vegetation Data 1978 vs. 2002

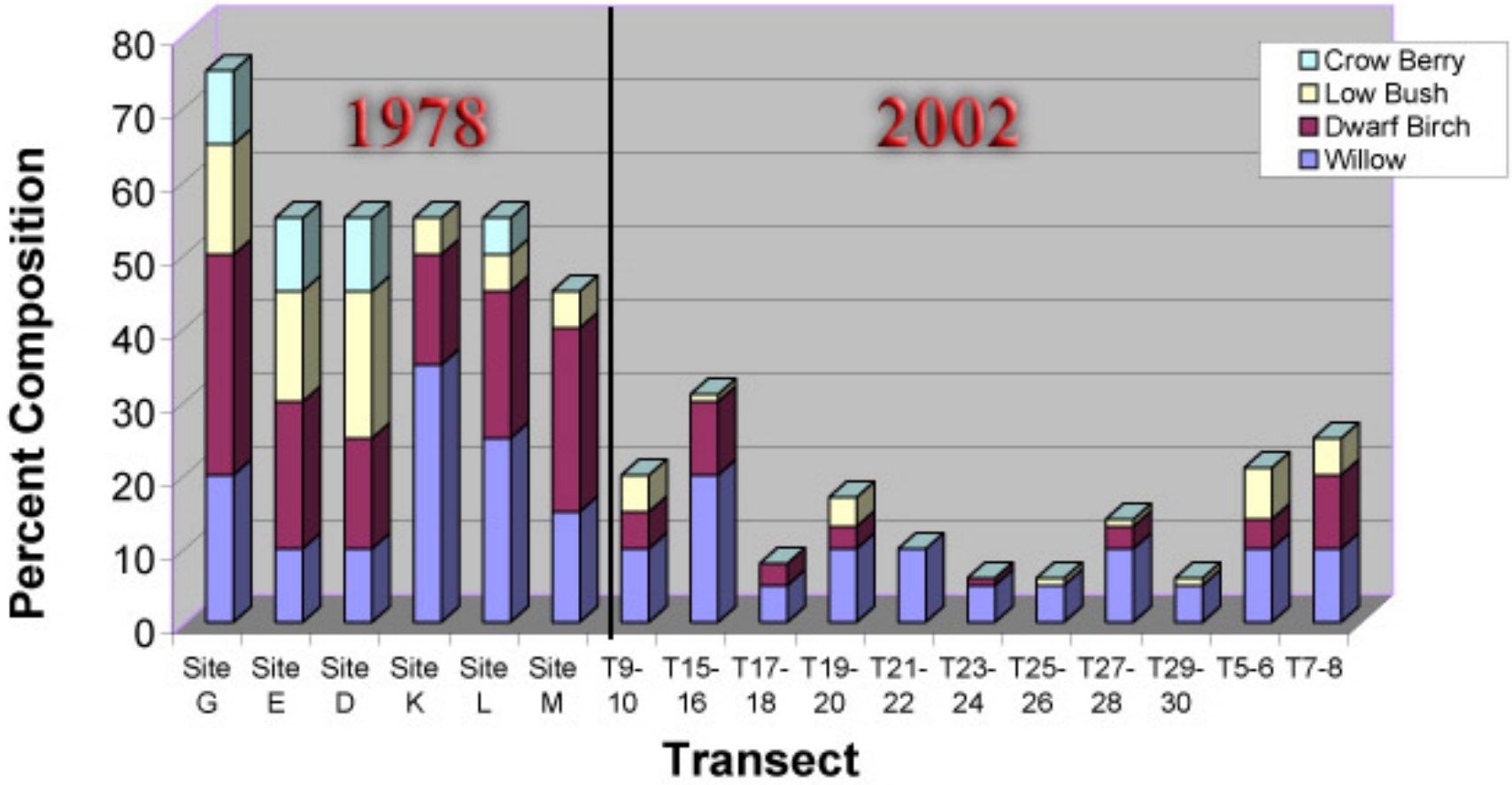

Table 1

Puviaq Ice Pad March 2003


Puviaq Ice Pad July 2003


CONOCO PHILLIPS
PUVIAQ #1
PTD 202-248
API 50-279-2008-00
1713 FNL 444 FWL SEC 35
T16N-R10 W UM

Results & Impacts:

- Delay in Plant Phenology
- Physical impacts from construction
- Thermal impacts to plants- severity index
- Thermokarsting- no evidence
- No significant impact to permafrost
- No significant impact to wetlands

Conclusion:

- The construction of ice roads and ice pads <u>DOES</u> impact tundra vegetation.
- Dry Upland sites show the greatest impact from ice roads, Wetland areas (vegetation) show little or no impacts.
- The environmental impact from ice road construction can completely recover over time.

30 4:42PM